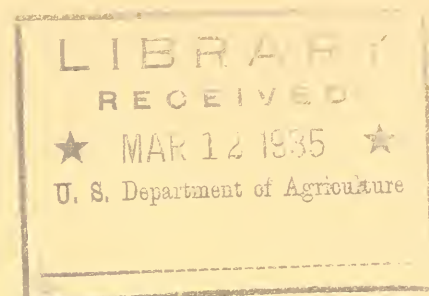


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FOREST RESEARCH DIGEST



ISSUED BY THE
LAKE STATES FOREST
EXPERIMENT STATION
MARCH, 1935

ANNUAL INVESTIGATIVE MEETING

Each year a research meeting is held which is attended by men from the Regional Office, Forest Supervisors, and the staff of the Experiment Station. The purpose of this meeting is two-fold; (1) to acquaint the men responsible for the administration of the National Forests with the findings of the Station during the past year and its plans for the coming year, and (2) to enable the research men to appreciate the technical problems confronting the administrative personnel and thus to give proper guidance to research efforts.

The meeting this year lasted three days, February 6, 7, and 8, and the Director of the Lake States Station made a special trip from Washington to attend it. Several concrete recommendations were made. The pressing need for the solution of many problems concerned with the production of satisfactory planting stock, as well as the lack of exact knowledge as to what constitutes satisfactory stock, was felt by both research and administrative branches. As a result, it was decided that the Station should undertake some nursery experiments at several of the National Forest nurseries in cooperation with the nurserymen in charge, providing funds can be supplied. A definite effort will be made to obtain the money needed.

The suggestion was made that the CCC camp superintendents and cultural foremen located near the Experimental Forests should be taken on a "show me" trip over these areas in order that they might become familiar with the experiments underway.

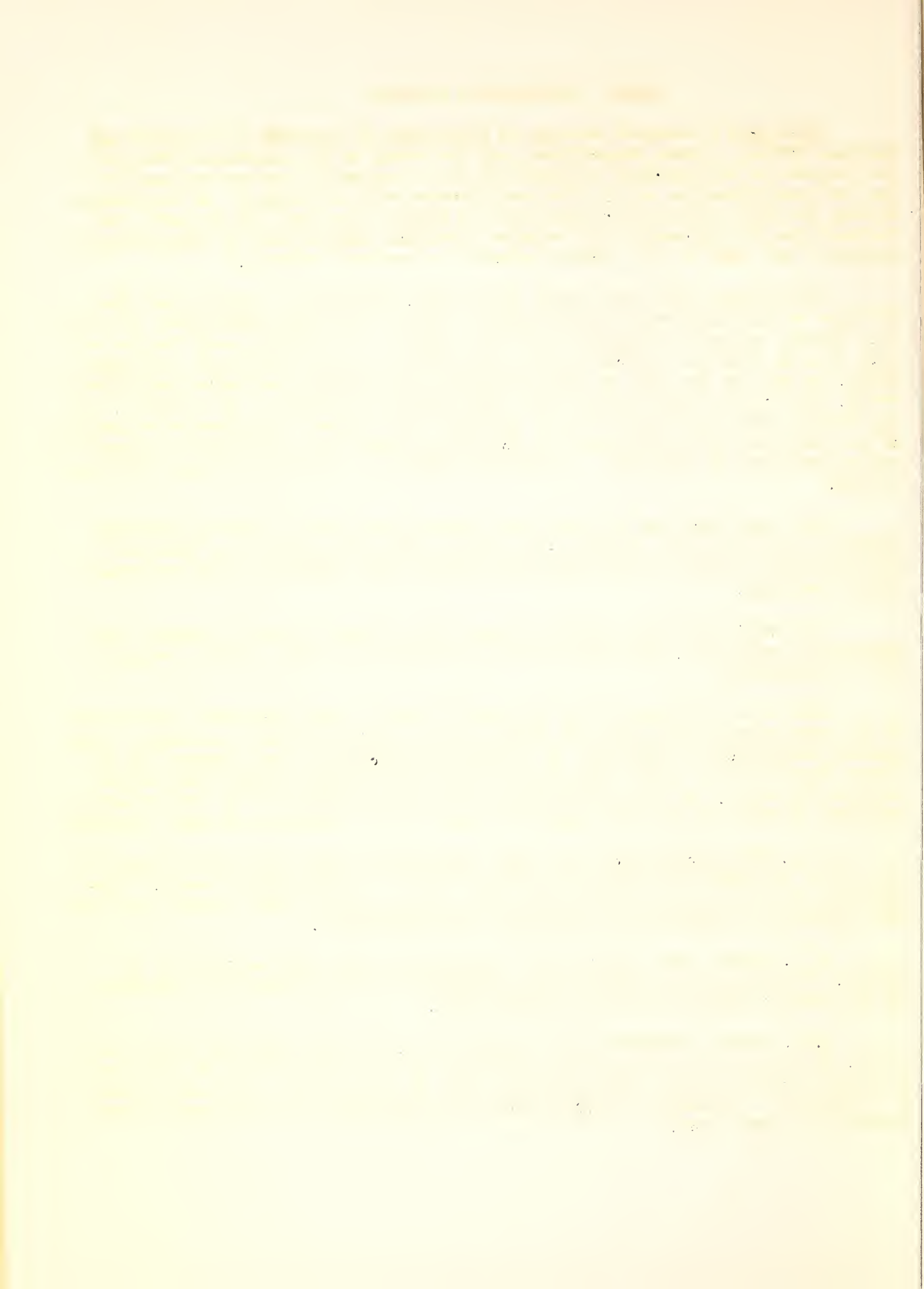
The compilation of a planting manual and a manual covering timber stand improvement practices, which will include the best knowledge of both branches, will be undertaken.

Some of the members of the Experiment Station staff presented the results of the past year's work along the several lines of investigation included in the present program of the Station. R. N. Cunningham outlined the progress of the Forest Survey in the region and presented some preliminary figures for north-eastern Minnesota. He also attempted to indicate an answer to the oft repeated question of what sum per acre should be spent in silvicultural or other treatment.

H. C. Moser pointed out the legal obstructions which have been placed in the way of the State of Minnesota gaining title to tax-delinquent lands. Regulations and laws passed subsequent to the original legislation on this subject have resulted in rendering the original laws inoperative.

E. S. Pierce then explained the Acquisition plans and policies of the Region. He stated that in Minnesota no further extension beyond the boundaries of the present purchase units is contemplated.

J. R. Neetzel described the new area of 4,100 acres, chiefly virgin hardwoods, which has been approved as an addition to the present area of the Upper Peninsula Branch Station, and presented a map showing how the area could readily be expanded to a minimum of 10,000 acres as recommended by the National Forest Reservation Commission.



J. H. Stoeckeler explained some of the difficulties encountered in planting in the sand plains of South Dakota where soil moisture is all important. He stated that once the trees could get their roots well down in the soil, their successful development is fairly well assured, due particularly to a high water table. Cultivation on both sides of the rows would appear to be an extremely valuable measure in helping the trees to survive the first few seasons in the field, and probably less expensive than frequent release cuttings which are often needed in the Lake States proper. Tests of different species have indicated the complete unfitness of several for planting in this region - these are Norway pine and Norway spruce. On the other hand, fair success has been had with green ash, hackberry, red cedar, ponderosa pine and Scotch pine.

P. O. Rudolf summarized the results of the Station's past work in planting research and presented recommendations for the selection of planting sites.

H. B. Wales described the research projects carried on by the administrative personnel. Certain types of research, such as time and cost studies which can be completed in one season, can best be carried out by the administrative branch. Such subjects would include cost of road building by different methods, usefulness of different types of equipment, studies of efficiency of personnel, and organization set-ups. However, more technical studies, many of which require specialized knowledge and long periods of time for their solution, are best left in the hands of the research branch proper, and the Experiment Station was urged to take over as much of this sort of work as possible.

DANGER OF IPS DAMAGE FOLLOWING CULTURAL OPERATION

Considerable damage by the Ips beetle has been detected following cultural operations in pine stands at Roscommon, Michigan and on the Superior National Forest. Freshly cut pine has a particular attraction for the Ips beetle which enters the wood and bores tunnels within the cambium. The beetle prefers dead green material, but if there is not sufficient of this present, it will enter living trees and kill them. Following observations on damage by this beetle, the subject was taken up with entomologists who made several suggestions for avoiding this damage. If cultural operations are carried out over large areas the damage will probably not be heavy as there will be enough freshly cut wood to take care of the beetles which have a decided preference for dead material. But where only small cuttings are made as on sample plots, the beetles are likely to attack green trees. The best time of year to cut in order to avoid infestation is probably in late summer and autumn. This gives the cambium and bark of the cut material a chance to dry out before the beetles emerge the following spring. Piling slash over stumps in order to let it dry out is another possible method of reducing Ips beetle damage but this practice perhaps should be discouraged as it prevents the slash from rotting and increases the fire hazard greatly. In order to avoid severe damage by this insect it may be necessary to limit cultural operations in pine stands to late summer and fall.

This same trouble was reported on the Cibola National Forest in New Mexico following cultural operations in ponderosa pine stands. The beetles here were found in the large slash piles the lower layers and centers of which did not dry out. Small piles appeared to be free from the insects.



A NEW PLANTING CHANCE FOR WHITE PINE

The natural restocking to hardwoods of cut over northern hardwood lands is almost always spotty and some planting will usually be necessary in order to make these lands fully productive.

During the spring of 1929 about two acres of a tract which was clear-cut the preceding winter on the Upper Peninsula Experimental Forest was planted to white pine. The trees were not planted to any set spacing, but were put in the natural openings and in skid trails. This required about 200 trees per acre. The survival at the end of six growing seasons is satisfactory and the growth has been remarkable.

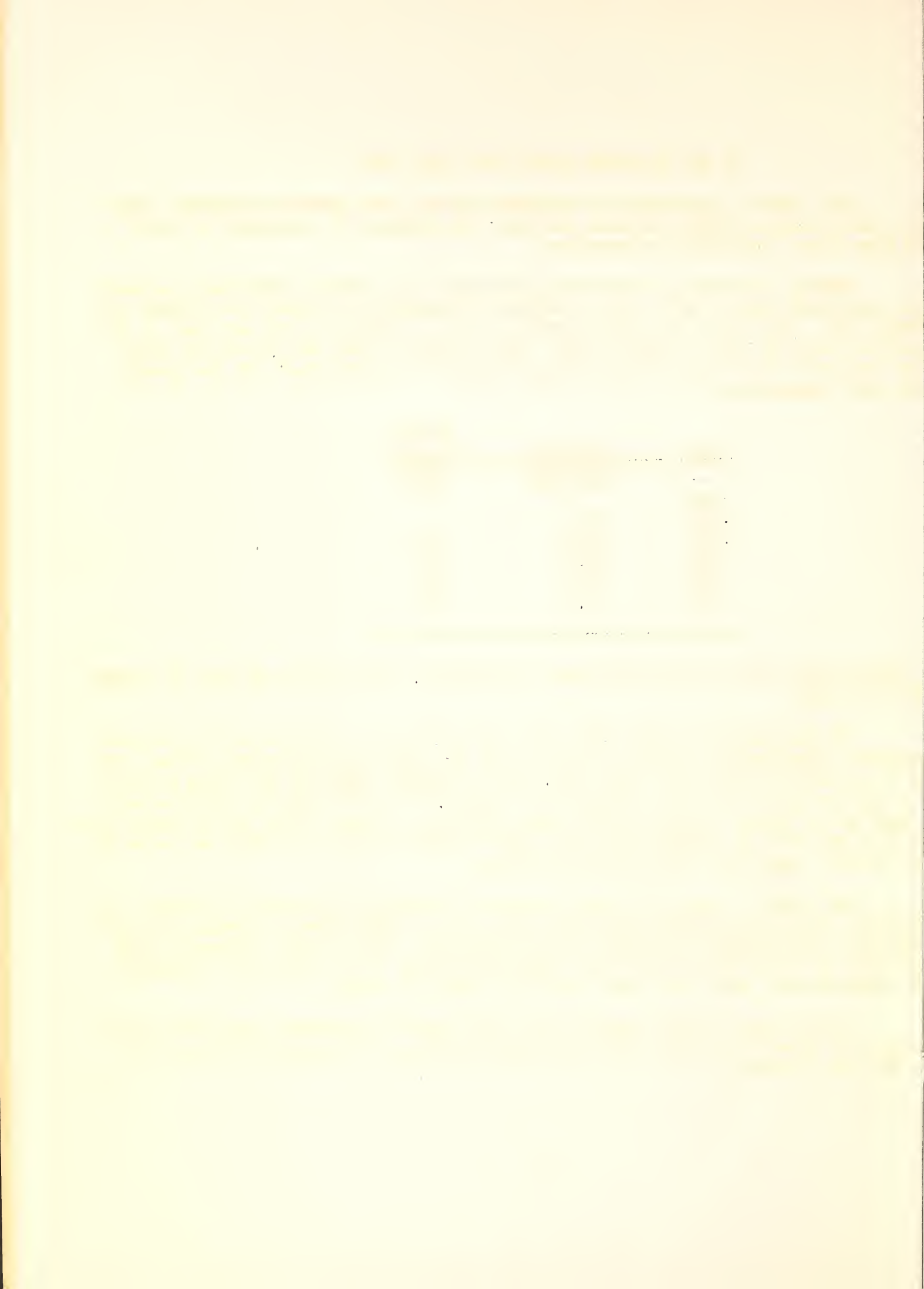
Year	Survival	Average Height
	Per cent	Feet
1929*	-	-
1930	93.6	-
1931	86.8	1.8
1932	82.7	3.0
1933	75.8	4.4
1934	70.1	5.9

* Transplants were of 2-2 stock grown in Michigan and averaged .6 feet in height when planted.

The development of the white pine has kept pace with that of the advanced hardwood reproduction and now at the end of the sixth growing season (total age of ten years) has actually taken the lead in growth. Some of the pines reached a height of 11.5 feet. The stems of the pines are very thick, the needles have a good green color, and the plants look extremely healthy. Most of the mortality to date has been the result of heavy rabbit injury during the first two years in the field. There has been no weevil damage.

The natural stands of virgin northern hardwoods in the Upper Peninsula of Michigan contained numerous scattered white pine. This species reached its best individual development in mixture with hardwoods. Due to their extremely high quality and value these trees were usually cut many years before the hardwoods and consequently white pine was eliminated from the stand.

The planting of this species on newly cut-over hardwood land gives every promise of success and when the pine becomes mature, the value of the cut will be greatly enhanced.



THINNING IN ASPEN

The remeasurement of six thinning plots in aspen established in 1929 on the Chippewa National Forest indicates a method of managing some of the vast acreage of aspen stands in the Lake States. Much effort has been expended toward the conversion of aspen to better types and for many areas this is probably the best solution. But the possibility of producing a valuable crop by proper management of the aspen itself on good sites has perhaps received insufficient attention.

In 1929 five plots in a twenty-year-old stand of aspen were thinned by the "head tree" method with the idea of growing veneer logs. The site index of these plots varied from 67 - 80 feet at 50 years of age. The object of the marking was to cut only trees which interfered with the growth of a number of trees, termed head trees, chosen to make up the final crop. All these selected trees were in the dominant and co-dominant crown classes, as were also most of the trees cut. The intermediate and suppressed classes were left largely intact as these classes were not expected to interfere with the growth of the selected head trees. Three different spacings of head trees were tried out: 10-1/2 feet, 15 feet, and 20 feet. One plot was left uncut as a control. On one of the plots the trees to be removed were girdled instead of being cut.

The growth of these plots during the first five years after thinning was determined by remeasurement in 1934. As was expected, the increment in diameter was in direct proportion to the severity of the thinning. Height growth, however, did not appear to be affected by the thinning in any regular manner. But contrary to expectations, the thinned plots in most cases made greater growth in basal area than the control in spite of their reduced original basal area per acre. The table below gives the increment:

<u>Spacing</u> <u>Feet</u>	<u>Site Index</u> <u>(50 years)</u>	<u>Basal Area Per Acre - Square Feet.</u>		
		<u>1929</u>	<u>1934</u>	<u>Increment</u>
Check	69	36.1	48.8	12.7
10-1/2	75	30.2	48.0	17.8
15	73	19.1	31.6	12.5
20	71	12.4	22.6	10.2
10 $\frac{1}{2}$	67	25.3	42.3	17.0
15	80	28.4	45.0	16.6

So far the heavy thinning does not appear to have caused any decrease in the potential quality of the timber but it may well be that heavy thinning at too early an age will in time result in the growth of large branches at relatively low heights on the trunks, thus considerably reducing the value of the timber for such uses as veneer.

GIRDLING REDUCES COST OF CULTURAL WORK IN SECOND GROWTH NORTHERN HARDWOOD STANDS

The cost of satisfactory stand improvement in young hardwood stands has been prohibitively high. Silviculturally these stands need some cultural treatment and the use of girdling offers distinct possibilities for decreasing the cost of the operation.

During November, 1934, six half-acre plots were established by the Station, in a thirty-year-old stand of typical hardwoods on the Hiawatha National Forest. The marking was designed to release the smaller and somewhat younger sugar maple and other desirable hardwood species from the overtopping pin cherry, which ranged from 1 to 7 inches in diameter.

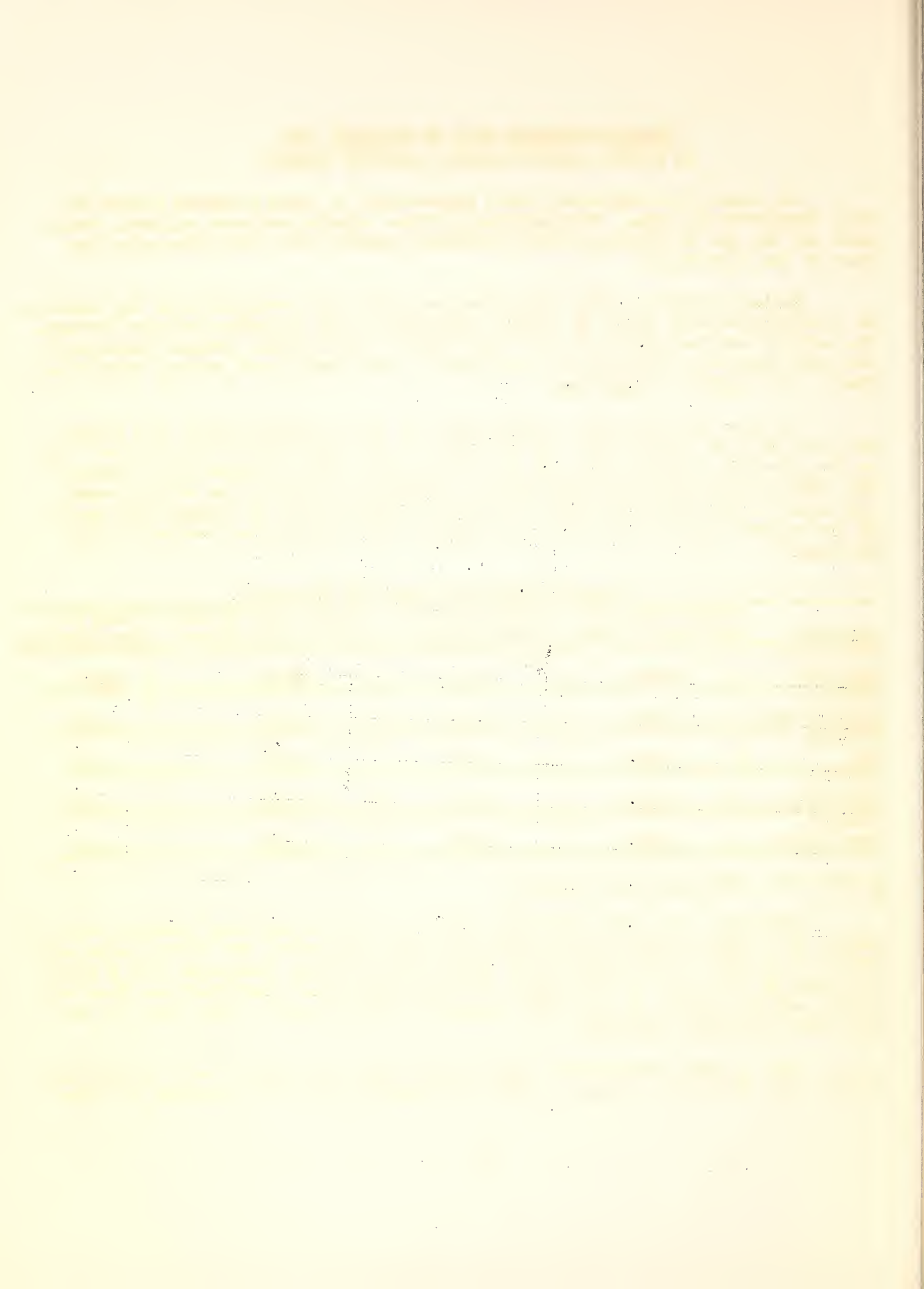
One plot was left for a check plot; all of the marked trees on a second plot were felled with an axe, and the trees on the other plots were girdled with an axe, Syracuse marking tool, chain saw, and draw knife respectively. Regular CCC labor was used for each operation. A summary of the results of this study are shown in the following table. The best indication of the comparative merit of the several tools is given by the column headed "Basal Area Treated Per CCC Man Hour."

Cost of Different Types of Treatment				
Method	:C.C.C. Man Hrs. : :to Treat $\frac{1}{2}$ Acre	: No. of Trees Per : : Acre Treated	: Basal Area Treated : : per CCC Man Hour	: Cost Per : : Acre Treated
Trees cut with axe	: 13.40	: 15	: 0.390	: \$4.20
Girdled marking tool	: 4.20	: 36	: 1.134	: 1.33
Girdled axe	: 5.35	: 47	: 1.680	: 1.72
Girdled chain saw	: 4.25	: 53	: 2.188	: 1.36
Girdled draw knife	: 3.45	: 56	: 3.198	: 1.15

1/ Based on a $6\frac{1}{2}$ hour day at \$1.00.

Girdling, even with such crude tools as an axe or Syracuse marking tool was from 3 to 4 times as fast as felling with an axe, and where the better tools such as the chain saw and draw knife were used, this advantage increased 5 to 8 times over that of the axe. If the number of trees cut on the first plot had been equal to the numbers girdled on the other plots, the differences in cost per acre would have been even more striking.

Put in terms of practical application this means that a well trained man using a draw knife can average an acre of satisfactory release cutting per day.



BORDER CUTTINGS AS AN AID TO REGENERATION

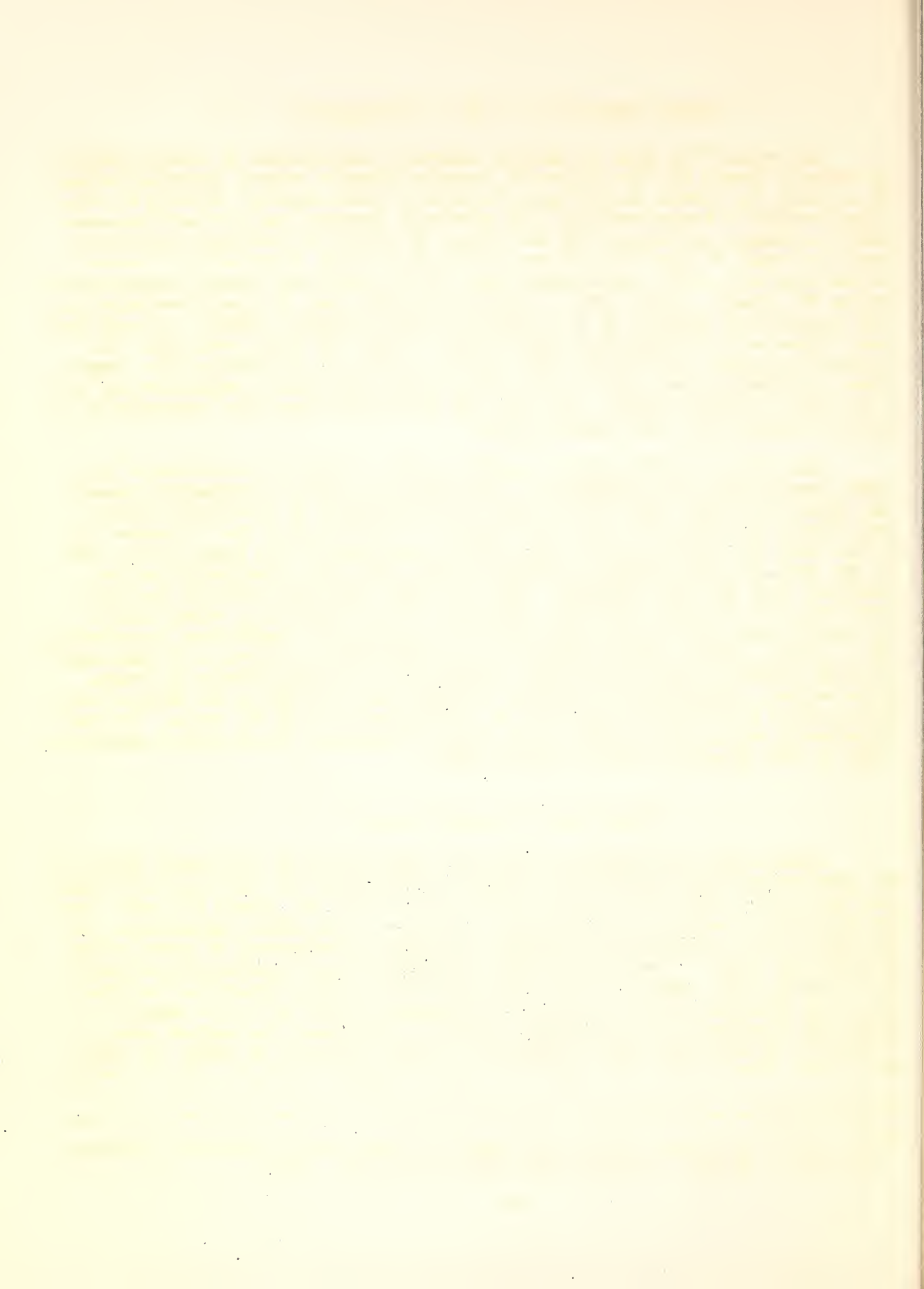
An article* by Henry I. Baldwin indicates that methods of cutting adopted in northern Europe for the purpose of securing adequate natural reproduction may be of value for certain forest types in parts of this country. Cutting by echeloned strips or border-cuttings with northeast exposure has been used successfully in Germany and Sweden with the object of giving the seedlings protection from the heat. In this silvicultural system the forest is felled in a series of cuttings made on the northeastern edge of the forest and carried progressively across the stand. In this way the freshly cut-over area is always protected on its southwestern exposure by the remaining stand of mature timber. On south and west exposures the temperature often becomes lethal for young seedlings. The northeast exposure is protected from the sun except for the morning when temperature is normally lower than in the afternoon and when higher humidities and dew also exert a cooling effect. This type of cutting has been used successfully in stands of Scotch pine and Norway spruce.

That such a method might be useful in this country is demonstrated by a study carried out in New Hampshire. The amount of natural reproduction around the edges of a dense stand of red spruce was determined by systematic counts, made inside the forest and extending outside at right angles for a distance of 6 rods from the forest's edge. Satisfactory reproduction was found on all sides of the area and this somewhat obscured the fact that the reproduction on the northeast side was most abundant. There was more difference between east and west than between north and south exposures. In the particular stand studied the differences were not important due to the presence of sufficient reproduction on all sides, but the greater amount on the northeastern exposure was unmistakable. It seems probable that this principle would hold in the Lake States in stands where natural reproduction is scanty, in which case fellings by the border cutting method would be of considerable help in the regeneration of the stand. Cutting experiments established in 1934 on the Superior National Forest should throw much light on this question within a year or two.

INVESTIGATION OF RODENT DAMAGE

Studies have been carried on by T. D. Burleigh of the Biological Survey at the Appalachian Forest Experiment Station in South Carolina which show the damage done by mice to young trees. The presence of slash on the ground following logging appeared to result in a considerable increase in the mouse population. The following year a check-up on the amount of natural reproduction of pines was made on this same area. In spite of a good seed crop no pine reproduction was present. This finding lends emphasis to the idea that cover, either natural or artificial, is a very important factor in rodent distribution. Cases of severe damage in arboretum plantings were also traced to mice, in this case the harvest mouse, a very small species, was found responsible. Other instances of damage to young pines were found to have been caused by the pine mouse, which ate off the roots.

*"The Density of Spruce and Fir Reproduction Related to the Direction of Exposure by Henry I. Baldwin. Ecology Vol. XIV, No. 2, April, 1933.



AGREEMENT BETWEEN FOREST SERVICE AND BIOLOGICAL SURVEY

This agreement, entered into the 4th day of January, 1935, by and between the Chief, Biological Survey, and the Forester, Forest Service, for the purpose of outlining the responsibilities and functions of each agency, and encouraging a maximum degree of cooperation, provides as follows:

1. Mutual recognition that:

- (a) The Biological Survey is the recognized bureau of the Federal Government directly charged with the responsibility for conducting research necessary to lay the foundation for wildlife management throughout the country.
- (b) The Forest Service is the recognized bureau of the Federal Government directly charged with the responsibility for the administration of the National Forests and for the management of national-forest resources, of which wildlife is one.

2. The general functions of the two agencies under this agreement will be as follows:

- (a) On lands under the control of the Forest Service, the Biological Survey will conduct fundamental research to determine principles upon which wildlife management plans will be based and will act in an advisory capacity in the carrying out of such plans and principles. On national-forest land the responsibility and authority for correlation and integration of wildlife management with recreation, timber production, grazing, and other uses of the Forest, will rest at all times with the Forest Service.
- (b) On lands under the control of the Biological Survey, the Forest Service will conduct fundamental research to determine principles upon which timber and grazing management plans will be based, and will act in an advisory capacity in the carrying out of such plans and principles. On lands under the control of the Biological Survey, the responsibility and authority for correlation and integration of timber and grazing management with recreation, game, and other uses will rest at all times with the Biological Survey.
- (c) In the event the available resources of either bureau are not sufficient to meet the research demands of the other bureau, that bureau, within the limitation of its resources, will proceed with the study of specific problems, collection of all factual information possible, and preparation of the plans. Such plans will be submitted to the other bureau for review and comment before application.

3. Other general considerations agreed upon are:

- (a) In the perfection and consummation of wildlife management plans, the two bureaus will cooperate to the fullest extent possible, and to this end there must be a free exchange of all pertinent data and frank discussion between members of the two bureaus.



- (b) All questions pertaining to the cooperative work of the two bureaus which arise in the field will be discussed on the ground by the leaders of the Biological Survey and the responsible Forest officer. Questions of disagreement will be referred to the Washington Offices of the two bureaus for decision.
- (c) Members of both bureaus will refrain from expressing in public a view contrary to the accepted policy or plans of the other bureau.
- (d) Insofar as possible the national-forest personnel will, in connection with its regular duties, make observations concerning life histories, numbers, and other pertinent data essential to wildlife management and administration.
- (e) To the fullest extent possible consistent with other work, the Forest Service will contribute time, equipment, and improvements, and will aid in securing the cooperation of outside agencies in furthering the rodent and predatory-animal control projects of the Biological Survey.
- (f) No predatory-animal or rodent control measures will be undertaken on national-forest land without the joint approval of both bureaus.
- (g) No game importations, involving the introduction of a new species, will be undertaken by the Forest Service without first securing approval of the Biological Survey. In such cases the Biological Survey will, unless the information is already available, make a detailed ecological study of the habits and habitat of the species at home, with special reference to the conditions it will encounter in the new location.

4. This agreement shall continue in force and effect until terminated by written notice by either bureau to the other.

Approved by the Biological Survey on the day and date first above written, and by the Forest Service this 4th day of January, 1935.

The U. S. Biological Survey

By J. N. Darling, Chief

The U. S. Forest Service.

By F. A. Silcox, Forester.



